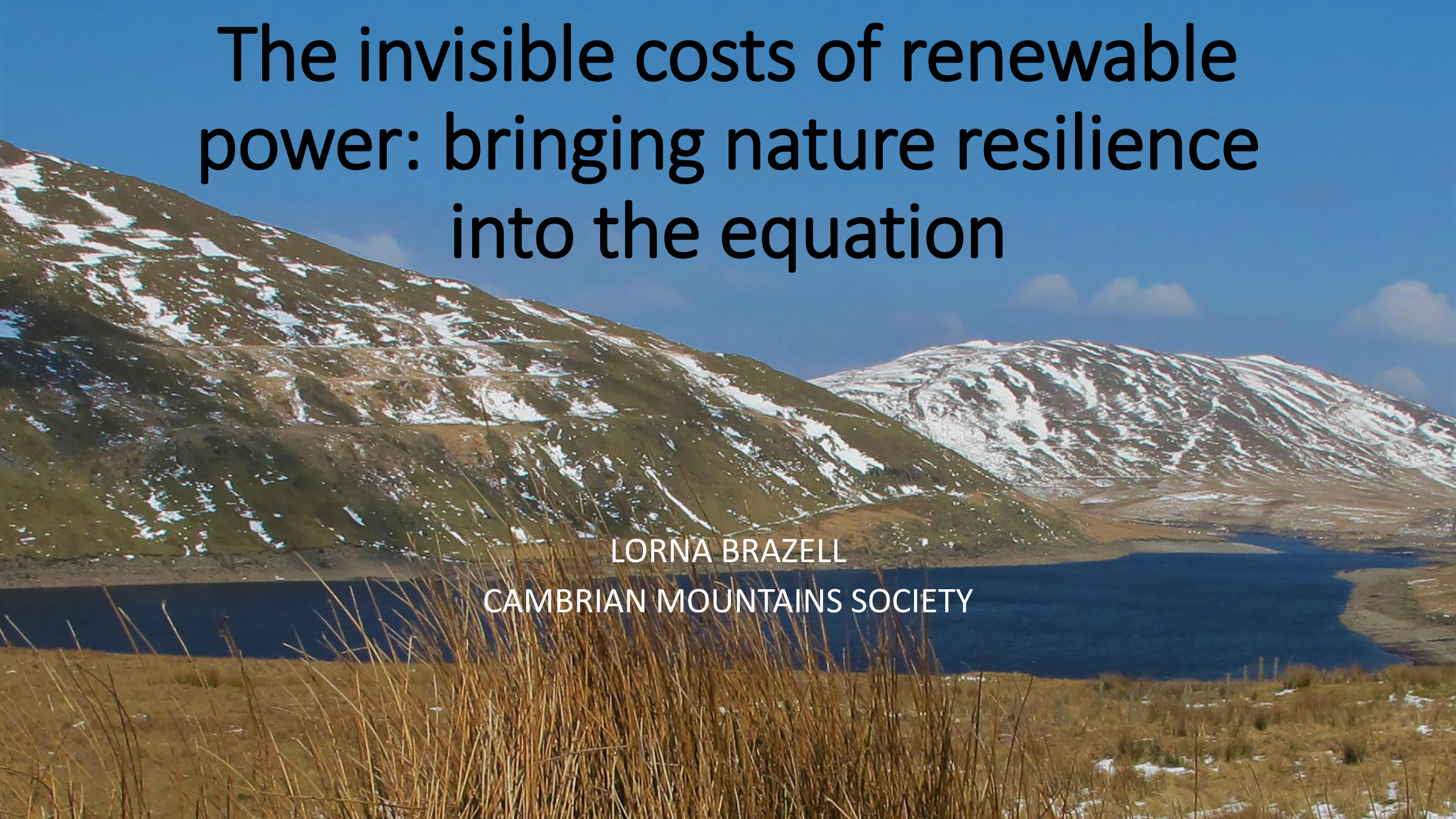
The invisible costs of renewable power: bringing nature resilience into the equation



LORNA BRAZELL

CAMBRIAN MOUNTAINS SOCIETY

…OR There is NO Free Lunch

LORNA BRAZELL

CAMBRIAN MOUNTAINS SOCIETY

WHO ARE THE CAMBRIAN MOUNTAINS SOCIETY?

- Local Charity founded 2005, to
- promote, **for the benefit of local communities** and the wider public, measures which will sustain or enhance the landscape, natural beauty, biodiversity, archaeology, scientific interest and cultural heritage of the Cambrian Mountains
- **advance the education of the public** in the landscape, natural beauty, biodiversity, archaeology, scientific nature, cultural heritage and geodiversity of the Cambrian Mountains

- See www.cambrian-mountains.co.uk
- And our Instagram account at Cambrian_mountains_society

A quick tour:
of the National Park that never was…

Up the Cwmystwyth valley

The Teifi Pools

Above Strata Florida

The Irfon through Abergwesyn Common

Llyn Brianne, looking east

Cwm Brefi

The view from Crugiau Merched

North from the top of Mynydd Mallaen

The view from Moel y Llyn

South-east toward Pumlumon

Pumlumon….
And the view from the top

Elan Valley reservoirs

Cynghordy Viaduct

TALKING ABOUT NATURE LOSS IS HARD

- Slow-motion car-crash, no noticeable step-change
- Distributed – everywhere and nowhere
- No villain to blame – all of us, but none more than others
- “Nothing to be done”
  - Sense of helplessness

- Solution: talk about the small wins
  - A nature reserve here, a species conserved there

THE JOYS OF RENEWABLE ENERGY

- Converse of the nature loss problem:
- We have climate change, yes, but now
- **We have The Answer!**
  - **More solar, more turbines, everywhere right away**
  - “No carbon emissions”
  - Unlimited, cheap electricity
  - Nostalgia?
    - Wales can be a “Green energy superpower”

TAKING A STEP BACK:
a cost-benefit analysis

- How much will building turbines throughout Mid-Wales contribute to slowing climate change?
  - In Wales or anywhere else
- How much will building turbines in Mid-Wales contribute to accelerating nature loss throughout Wales?
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WALES' CONTRIBUTION TO CLIMATE CHANGE

- Wales' share (production or consumption) is a tiny piece of the whole UK
    - peak power demand is 2.5GW (a cold winter night) cf UK peak demand 61.1GW
    - existing Welsh renewable generation can deliver 3,400MW
        - If the sun shines and the wind is blowing.
    - Plans for offshore wind in Irish/Celtic seas dwarf Wales' projected needs
        - Which may in any case be less than past projections suggest (Spain's experience)
- Moral responsibility
    - We
        - Use more energy per person than past generations
        - Travel more than past generations
        - Consume (and waste) more stuff than past generations
    - …. Isn't that what we really need to tackle?

RENEWABLES' CONTRIBUTION TO SLOWING CLIMATE CHANGE

- *Average* or *total annual* generation cf actual, day-to-day generation
  - ***What matters: Power*** or ***energy?***
- The issues:
  - Need to provide a system which can ***always*** power ***everything, UK wide***
  - Can't turn the weather on and off as demand fluctuates
    - "feast or famine"
  - Can't guarantee any particular level of generation *at all times*

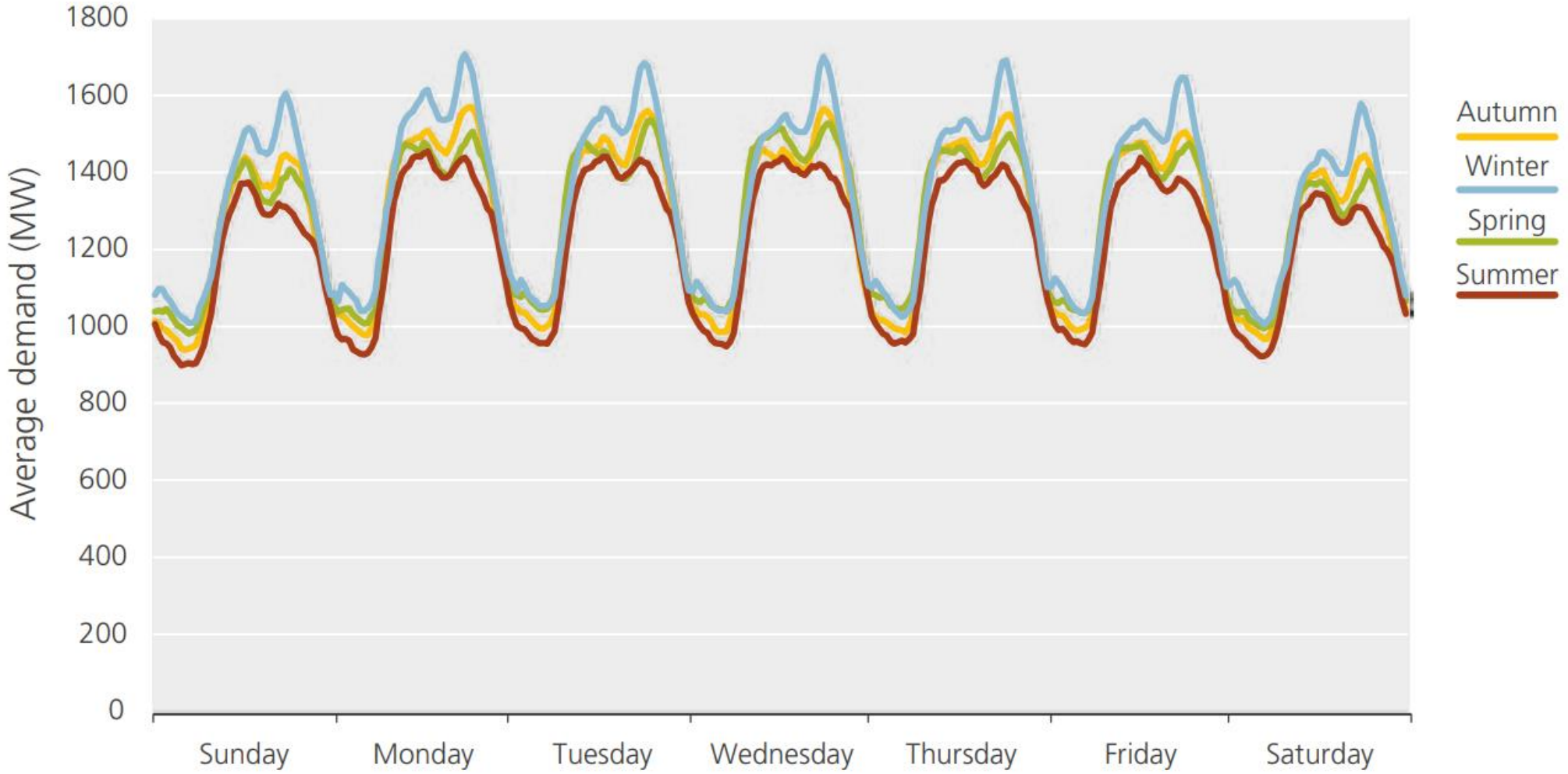
- ***Plenty of power* when no one needs it *is no use at all – without storage***

WHERE'S THE RUB?

- Renewable sources do generate a lot of electrical *energy*
  - When the wind blows/ sun shines
    - A domestic turbine, generating intermittently, still cuts the user's annual bills
- Real problem: today's society is totally designed in the expectation of unlimited, on-demand POWER

- Renewable energy: not a tap connected to the mains, more like a standpipe connected to a spring
- Sometimes gushing – HIGH power - fill a bath in minutes
- Sometimes, just dribbling – LOW power - fill a bath in days?
- Occasionally, dry! So, you need a reservoir….

WALES DAILY POWER DEMAND

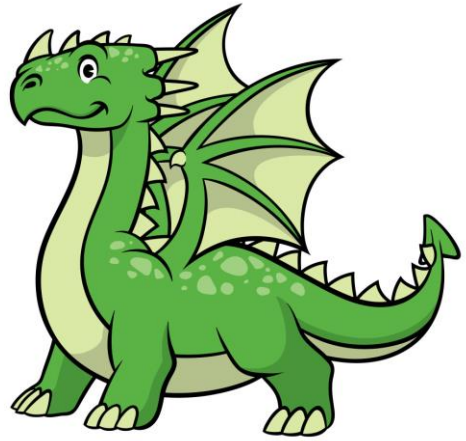


WON'T MORE TURBINES SOLVE IT?

- Even turning slowly, the turbines can, in a year, generate plenty of energy ("fill the bath")
  - Too much in summer; too much at night – so we turn them off
- BUT does this solve the CO_2 problem?
- Sadly, **no**: as more renewable power stations are built, more and more they'll compete with each other, not with gas
  - Rate at which they displace fossil fuel consumption is falling
  - Rate at which we produce less CO_2 per gigawatt is falling too
  - NESO accepts we CANNOT reach zero this way
- Fine, provided there is ***either*** a back-up system ***or*** storage to
  - capture the energy when it isn't being used, and
  - release it flexibly when it is needed

AS MUCH WIND POWER AS WE CAN – A GREEN SUPERPOWER??

- Spreading turbines around ***reduces*** but ***doesn't solve problem***
  - Weather systems can be Wales-, UK- or even western Europe-wide
  - Still need to buy in power or store energy for 'lean' days
  - When we need to import power, on average there's less renewable nearby in Europe too
    - So we sell (renewable) cheap when EVERYONE has excess
      - Negative wholesale electricity prices
      - In 2025 several countries had 3 weeks, Sweden had over a month!
    - Then buy (fossil fuelled) dear when everyone needs it



- Talk of "Net zero" is a sleight of hand: **unless we build UK-scale storage**, nuclear or fossil fuels (burnt elsewhere) will always be part of Wales' energy budget
  - Royal Society Report on Large Scale Electricity Storage, September 2023

Producing more than Wales needs can only ever make a very minor contribution to reducing fossil fuel use/ climate change

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WHAT STATE IS WALES' NATURE IN?

- Two new NRW Reports in 2026:
  - Habitats Regulations 9A Report for Wales 2019-2024
    - Lack of evidence – no one's even trying to monitor what is being done with/to supposedly ***protected*** habitats and sites
  - SoNaRR 2025
    - Lack of evidence…
    - Wales' natural environment remains at a critical tipping point.
    - Nature across the country is under sustained and intensifying pressure,
    - Ecosystems struggling to cope with the ***combined impacts*** of climate change, pollution, habitat loss and unsustainable land use.
    - Almost one in five species now faces extinction in Wales,
    - Only 40% of Welsh water bodies achieve good water quality status, and
    - Ecosystem resilience remains low across much of the country

AREN'T THE NATIONAL PARKS AND LANDSCAPES ENOUGH?

- Campaign for National Parks 'Healthcheck' in 2024
- Biodiversity: lack of evidence
  - But no suggestion any better than the rest of Wales
- Water quality even in the National Parks is suffering badly
  - 51% of rivers and 21% of lakes in National Parks achieved good overall status, or higher
    - compared to all-Wales figures of 44% for rivers and 19% for lakes
- Just 23% of SSSI features in National Parks are in favourable condition
  - slightly better than those outside at 19%

WHAT DO THE CAMBRIANS HAVE TO OFFER?

- 2024-5 CMS Biodiversity Report
  - A look at the NBN Atlas data to assess how the Cambrians stack up against the National Parks
    - More people -> greater pressure on habitats and wildlife
  - Inching closer to completion – but more material keeps being found!
  - Conclusion in brief:
    - the Cambrians will never be as biodiverse as Eryri, as the underlying geology is more homogeneous
      - Fewer distinct habitat types
    - But the Cambrians are *more biodiverse than Bannau Brycheiniog* and represent an irreplaceable ecological corridor connecting Wales' uplands
      - Without which, biodiversity in each area is isolated and less resilient to climate change

HOW MUCH WILL BUILDING GIANT RENEWABLES ACCELERATE NATURE LOSS IN MID-WALES?

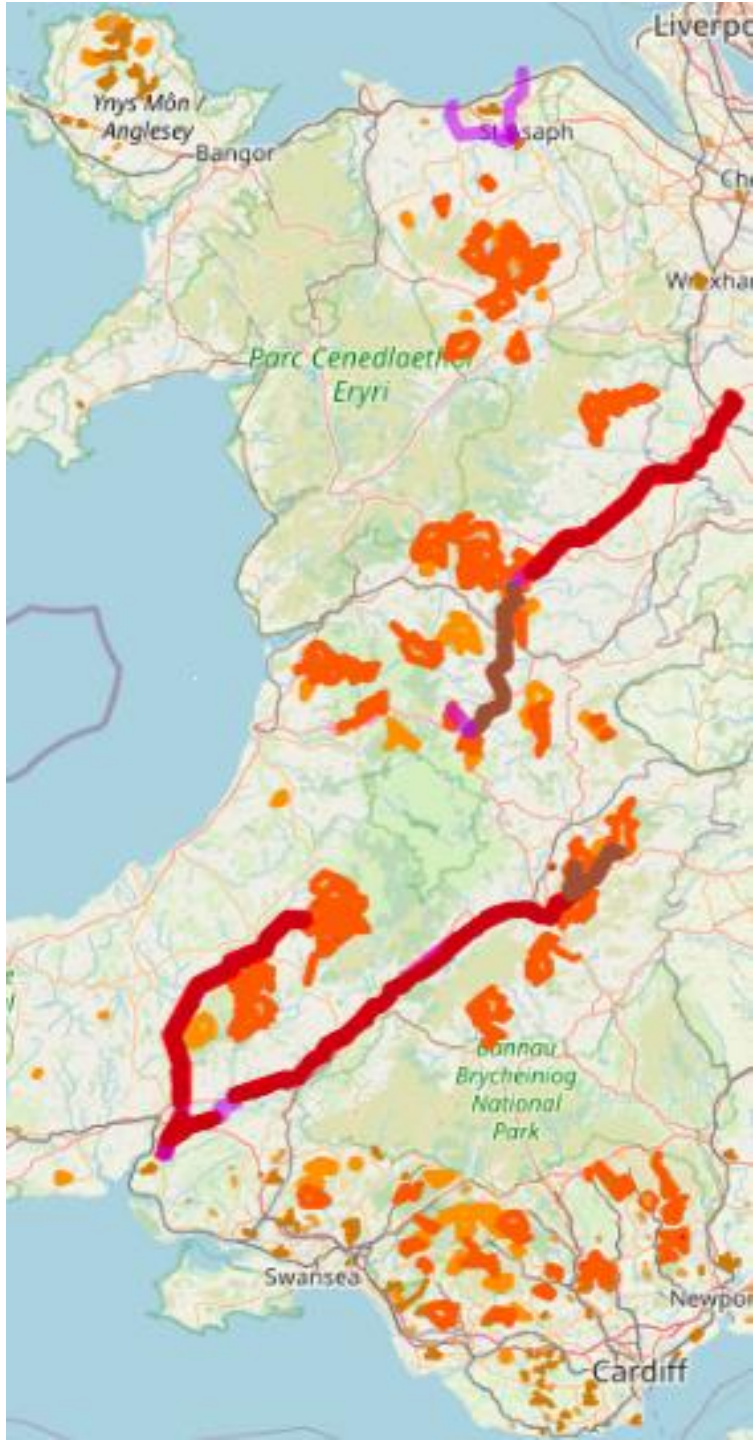
- Lawton Review: nature resilience needs
  - natural habitats that are
  - more numerous,
  - bigger,
  - in better condition and – crucially –
  - joined up.
- Isolated nature reserves are not enough.
- **FRAGMENTATION -> VULNERABILITY**
- Mid-Wales fits the bill for maximum resilience!
  - Far less widespread modern development than South Wales, NE Wales or almost any part of England
  - Lower rate of 19-20th century land-use change than most of Great Britain
  - Undrained bogs, extensive heaths, semi-natural grasslands and patches of natural scrubby woodland

RENEWABLE ENERGY POWER STATION PROPOSALS … *so far*

The Cambrian Mountains ones:

- Lluest y Gwynt (Pumlumon Fawr/ Drybedd)
- Banc Ddu and Rhiwlas (Llangurig)
- Bryn Cadwgan (Cwrt-y-Cadno)
- Waun Maenllwyd (Llanddewi Brefi)
- Esgair Galed (Dylife)
- Lanfawr (Llanddewi Brefi/ Llanfair Clydogau)
- Bryn Rhudd (Llanddewi Brefi/ Tregaron)
- Waun Hesgog (Talybont – Taliesin)

Rumours of a further proposal above Pontrhydfendigaid



MARINE TURBINES COMING ONSHORE

Step-change from existing turbines

- Typically 65m tower, 75m diameter blades
  - Total height 100m

New turbines typically 180-230m total height

- Blades close to 100m
  - Require road modifications to access
- Soil/ peat excavation and tens of thousands of tonnes of concrete for foundations
- Majority position on hill/ridge tops
  - Visible across huge areas
  - Maximum impact on birds including migrations
- Corollary: road preparation, access tracks, substations, pylon chains, construction/ logistics hubs
- Cumulatively **ENORMOUS** impact on biodiversity of previously-unindustrialized land

HOW MUCH WILL BUILDING GIANT RENEWABLES ACCELERATE NATURE LOSS IN MID-WALES?

- Wind turbines themselves:
  - Blade collisions of birds, bats and insects
    - And internal injuries due to rapid pressure changes near trailing edge
  - Modification of air flows, creating a microclimate of reduced wind speed but greater turbulence
    - changes temperature distribution and plant transpiration over a significant area
    - Ultimately favours different suite of plant species
  - Sound (audible and infrasound) affects species including reptiles' and amphibians' behaviours:
    - mating, hunting, hibernation.

HOW MUCH WILL BUILDING GIANT RENEWABLES ACCELERATE NATURE LOSS IN MID-WALES?

- Access tracks, concrete foundations, logistics parks, substations and transmission infrastructure:
  - Loss of habitat area, ***as such, and also*** resulting in
  - disconnected smaller patches of habitat that are intrinsically less resilient
    - Saturation from flooding,
    - dessication from wildfires or extended drought periods

  are more likely to affect an entire population if its territory is smaller
  - Pollution from vehicles along the access tracks contaminate soil and air
    - up to 100m either side
  - Long-term soil compaction, and soil erosion
  - Edge effects changing the species best able to adapt to the site

HOW MUCH WILL BUILDING GIANT RENEWABLES ACCELERATE NATURE LOSS IN MID-WALES?

- Access tracks, concrete foundations, logistics parks, substations and transmission infrastructure:
  - Drainage changes affecting
    - groundwater distribution
    - groundwater levels, and
    - runoff

    all change distribution of soil flora and fauna
    - hence affect the food web higher up (*the stuff people actually notice…*)
  - Changed runoff affects silt levels in streams and rivers connected to the site
  - Culverts and bridges can act as barriers to movement of local aquatic species
  - Introduction of species not previously present, whether ‘GB native’ or alien
    - cleared areas and disturbed soils
    - traffic carrying soils and seeds
    - rapid establishment of species which then expand into surroundings

HOW MUCH WILL BUILDING GIANT RENEWABLES ACCELERATE NATURE LOSS IN MID-WALES?

- Cumulative effects:
  - Changes plant/ microorganism assemblages = fundamentals of the food web
  - Reduces displaced species' ability to resettle or colonise nearby areas with similar conditions
  - sensitive wildlife species avoid buildings/ other human structures
    - Reduced residual areas for them to occupy
  - Increase in tracks increases human footfall
    - drives wildlife away both spatially *and* temporally
    - increasing nocturnal activity among species that would otherwise be present during daylight

- But most of all **FRAGMENTATION**

BASELINE SHIFTING:

ONCE DEGRADED NATURE BECOMES THE NORM, FURTHER DEGRADATION IS ACCEPTABLE

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OTHER FORMS OF RENEWABLES

- Tidal barrage
  - E.g. La Rance in France; Swansea?
- Solar
- Offshore wind
- Pumped hydro
  - E.g. Dinorwig

- Geothermal
  - E.g.Redruth in Cornwall
- But in short: There is no Free Lunch when it comes to building
  - There will be a nature, and a human, impact

BETTER WAYS TO BUILD, AND CONNECT TURBINES

- IAG for Future Electricity Grid for Wales report January 2026
  - Lack of evidence…. ***Don't*** just build: do the homework first!
    - Priority areas: nature recovery, threats to birds, cumulative impacts on the visual and character attributes of landscapes, soil and soil habitat impact, including heat generated by underground cables, access roads over peat, carbon footprint for each technology and method of conveying electricity, economic impacts, cultural impacts (community cohesion); and the Wellbeing of Future Generations.
  - A National Grid is a complex, expensive network, need to plan layout for *efficiency* and *integrity*
    - Not just build a cat's cradle
  - NESO has been working on possible routes from N-S Wales and E-W into England for several years
    - GreenGen's convenience lines ("we have a wind farm now we'll build pylons") make no attempt to be part of an integrated, once-for-all system
- Nearer to energy consumers
  - Minimise transmission infrastructure to be built,
  - Minimise transmission losses and so
  - Minimise total energy needed to be generated
- Near to existing transmission infrastructure

BETTER WAYS TO BUILD TURBINES

- Near to developed/ industrialised land
  - With *low current nature value*
  - And good road connections
- Near to potential storage sites
  - Consider what possible/ feasible storage systems are for *UK-scale* storage:
    - Royal Society Report on Large Scale Electricity Storage, September 2023
  - pumped hydro? Where do you put the reservoirs?
  - Green hydrogen? Do we have salt mines?
- Away from river catchments, deep peat

BETTER WAYS TO BUILD TURBINES

- Current mitigations:
  - Bunds to ‘manage’ water flows
  - Relocate animals
  - Transfer peat into borrow pits
    - Hoping it will magically remain healthy, growing peat in the new location
  - Pay to restore some habitats somewhere else
    - Forever? What monitoring/ enforcement?
      - Australian experience is little/ transitory
    - Assumes that loss of total area of habitat, and increased fragmentation, is outweighed by greater resilience over that smaller area
      - Having no evidence baseline, we have no current meaningful way to ‘cost’ the nature impact of the development

BETTER WAYS TO BUILD TURBINES

- Current mitigations:
  - Add ‘country park’ facilities such as Whitelee near Glasgow
    - Not terribly relevant for energy parks a long way from cities
  - Community benefits
    - Non-contractual, non-binding

- BUT as the IAG report said,
  - “**Compensation should not be a substitute for a well designed and considered scheme**”

- Consider mitigating ever-growing energy demand
  - Do we ***really*** intend to go on consuming more
    - Per head, and in total

…. forever?

CAMBRIAN MANIFESTO 2026

- Instruct NRW to begin work on scoping the potential for a new **Cambrian Mountains National Landscape** to boost local communities through providing new opportunities for farming businesses, encouraging local investment and tourism opportunities while putting the culture, history and language of the area on the national stage.
- **Back farmers in all of Wales' uplands**, through an enhanced Sustainable Farming Scheme and a long-term commitment to the Ffermio Bro programme.
- A right for **every child in Wales to have an outdoor learning experience encouraging more responsible access through countryside code awareness** as a core part of the National Curriculum.
- A **true multifunctional land use framework for Wales** including clearly defined targets for stronger enforcement of existing laws in areas such as water pollution and wildlife crime as part of the 'Nature Positive' Bill.

WHAT CAN YOU DO?

- Join CMS!
- Quiz Senedd 2026 candidates:
  - Where do they stand?
  - Do they even know how many renewable power stations are being proposed in Mid-Wales, how big and where? Have they ever visited any? Have they seen what's being built in Scotland recently ?
    - (and what it's done to the landscape, the rivers, the peat)?
  - What do they think will happen to local traffic when these enormous structures are being transported into the sites?

WHAT CAN YOU DO?

- Respond to developers' consultations
  - With 'no!' rather than 'yes, we need renewables but…'
    - Developers report the latter as plain 'yes'
- When planning applications are validated, oppose
  - Cite impact on local economy, archaeology, rivers, peat and soils, birds and habitats, landscape
    - Especially the impact on views from Bannau Brycheiniog NP
    - But also on the views from the Cambrian Mountains!
  - … cultural heritage, community cohesion, future generations


QUESTIONS?
www.cambrian-mountains.co.uk